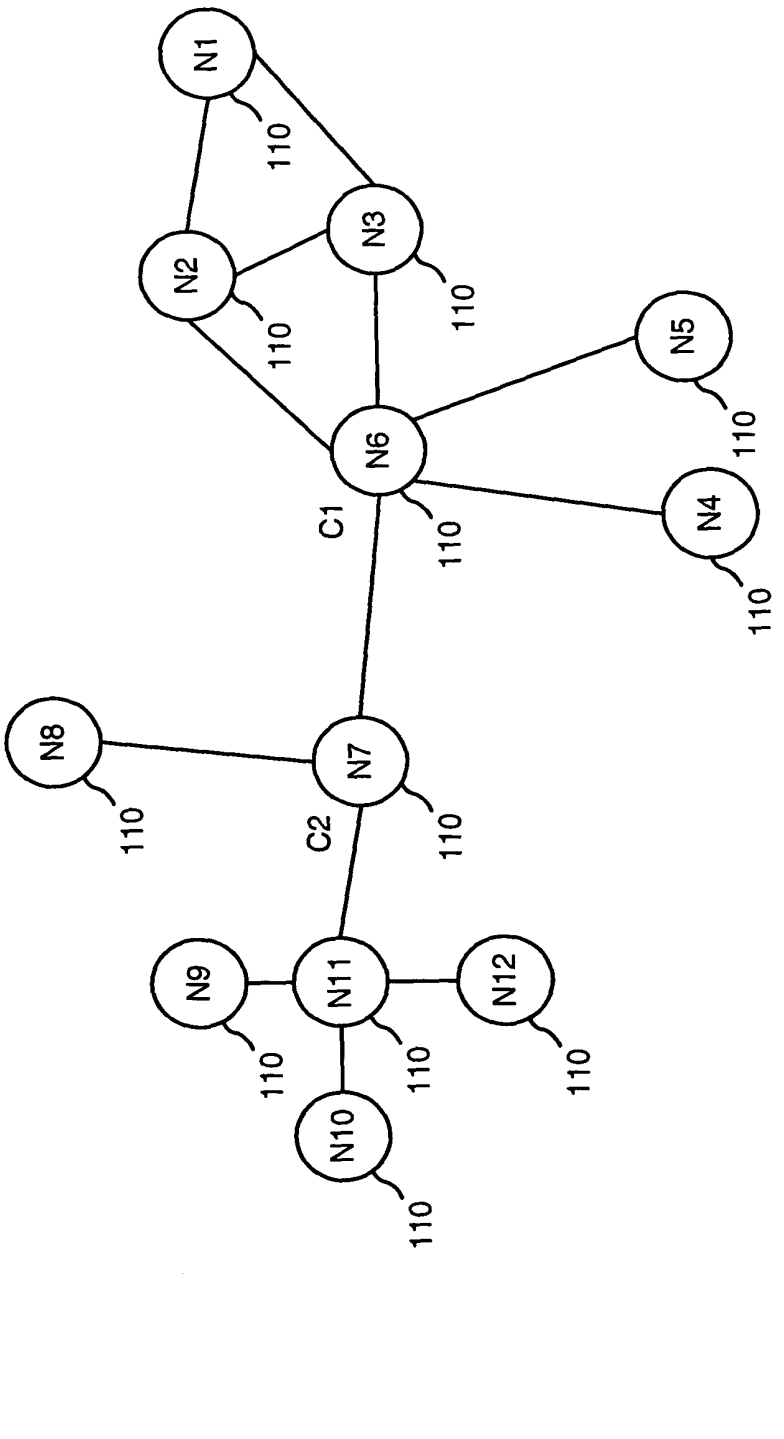
FIG. 1


N1
110
N2
110
N3
110
N5
110
N6
C1
110
N4
110
N8
110
N7
C2
110
N9
110
N11
110
N12
110
N10
110
100

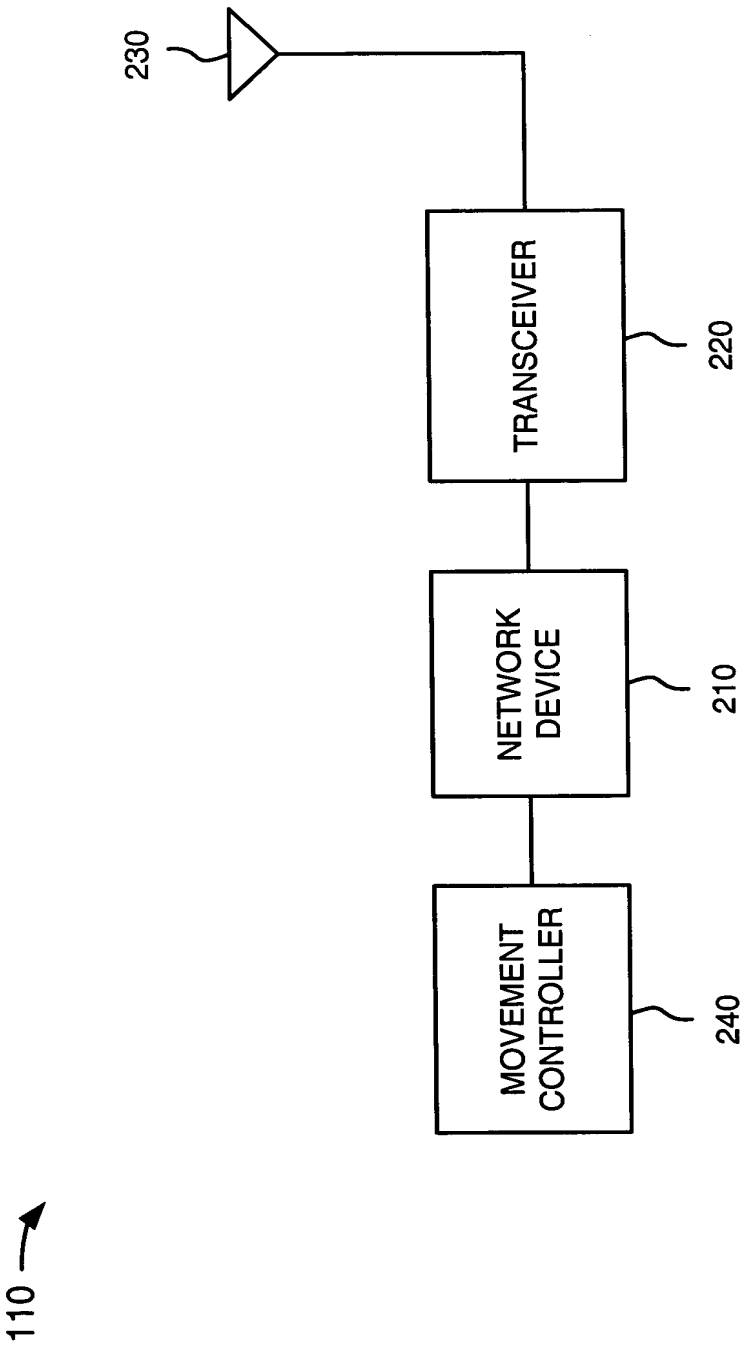
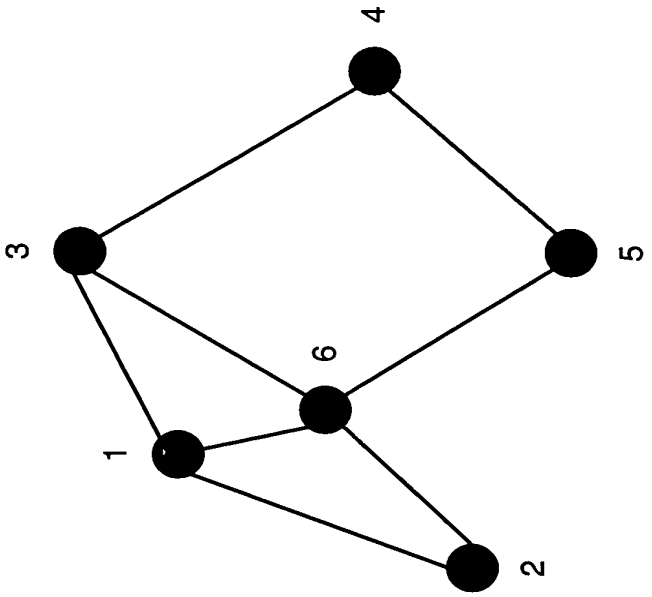
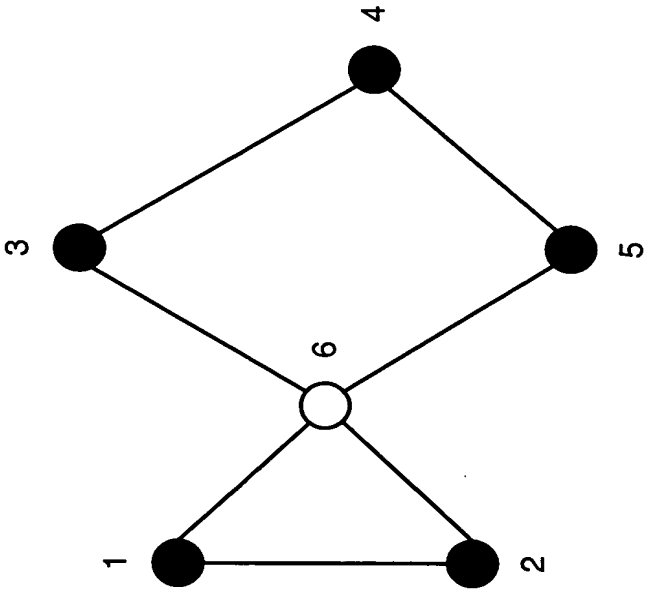

230
TRANSCEIVER
220
NETWORK DEVICE
210
MOVEMENT CONTROLLER
240
110

FIG. 2



320

FIG. 3B



310

FIG. 3A

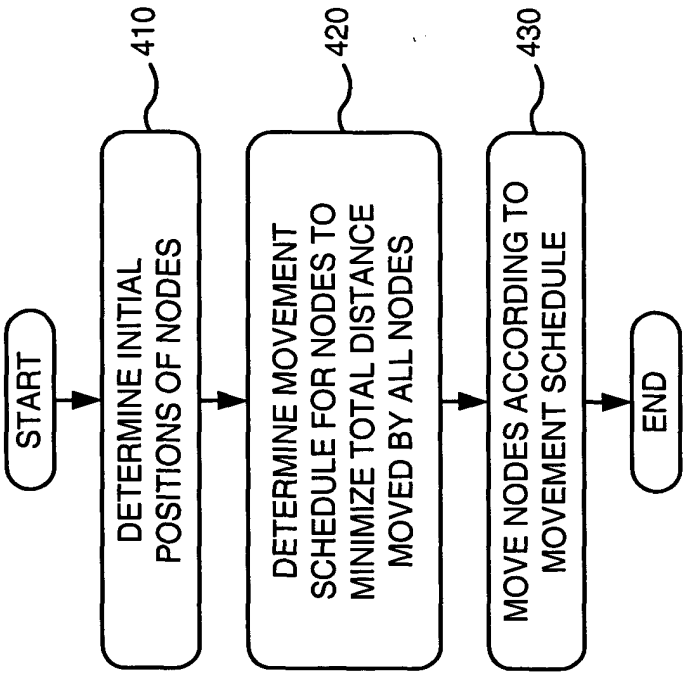

START
410
DETERMINE INITIAL POSITIONS OF NODES
420
DETERMINE MOVEMENT SCHEDULE FOR NODES TO MINIMIZE TOTAL DISTANCE MOVED BY ALL NODES
430
MOVE NODES ACCORDING TO MOVEMENT SCHEDULE
END

FIG. 4

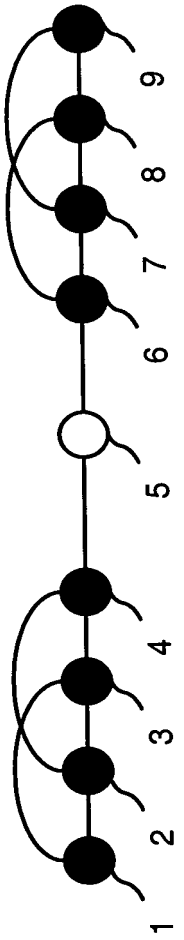


FIG. 5A

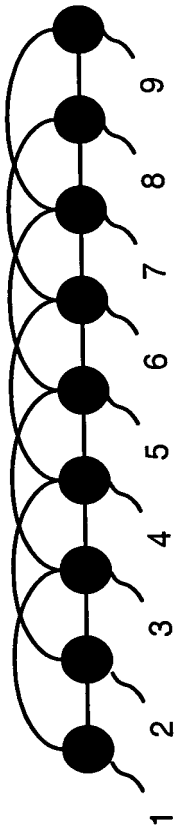


FIG. 5B

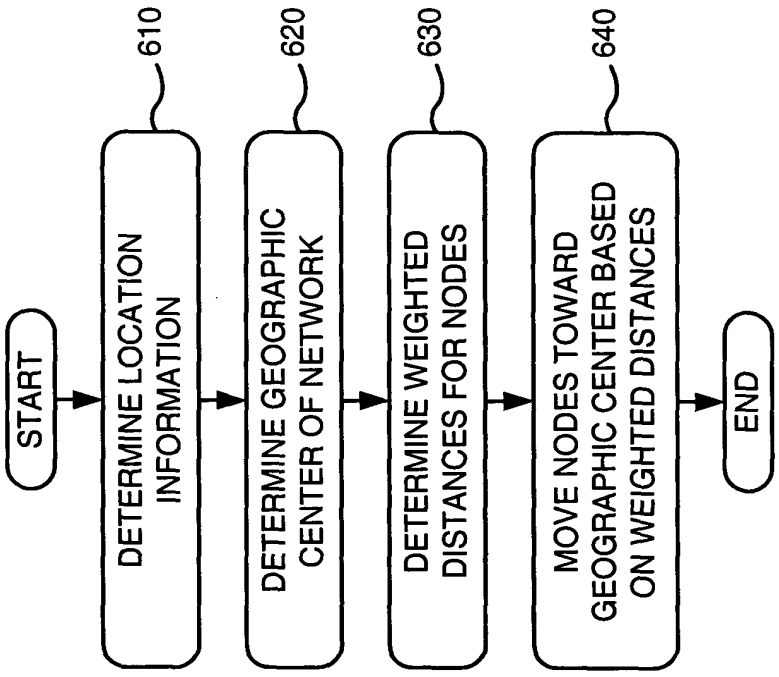

START
610
DETERMINE LOCATION INFORMATION
620
DETERMINE GEOGRAPHIC CENTER OF NETWORK
630
DETERMINE WEIGHTED DISTANCES FOR NODES
640
MOVE NODES TOWARD GEOGRAPHIC CENTER BASED ON WEIGHTED DISTANCES
END

FIG. 6

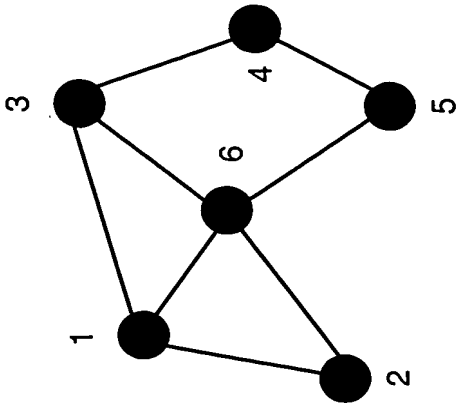


FIG. 7C

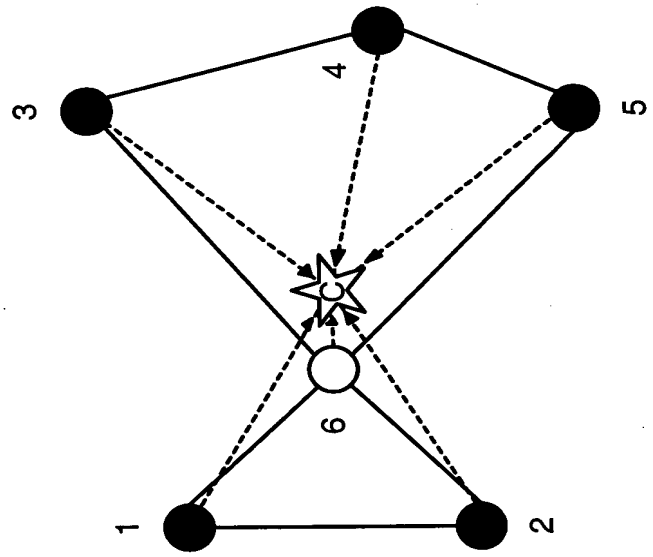


FIG. 7B

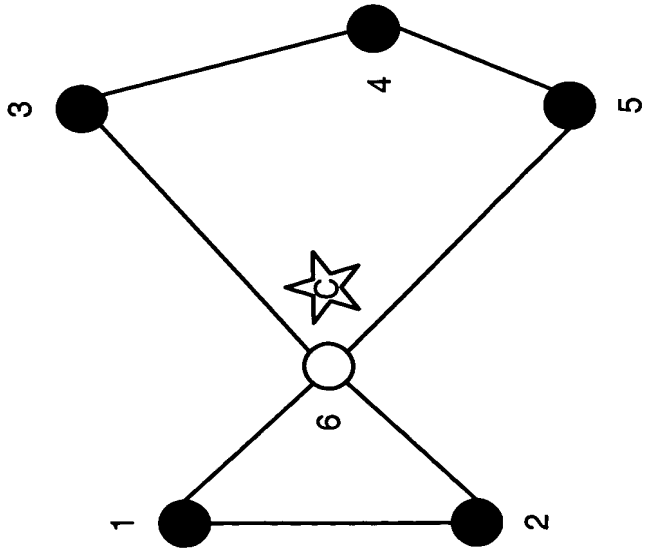
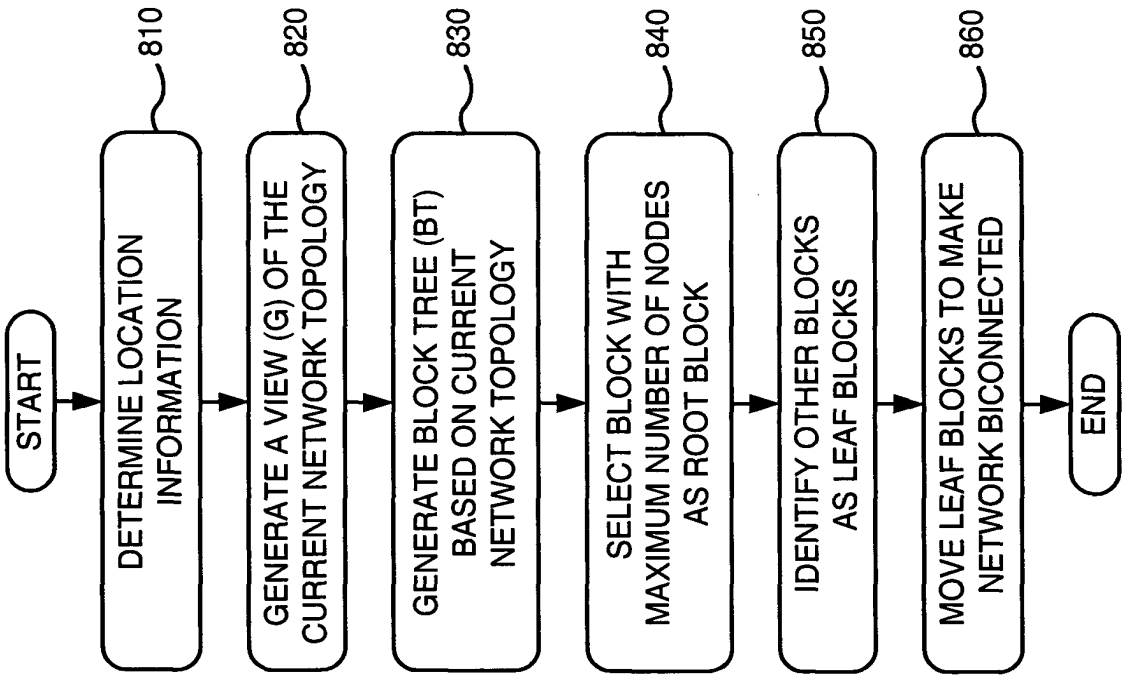


FIG. 7A

FIG. 8


START
DETERMINE LOCATION INFORMATION
810
GENERATE A VIEW (G) OF THE CURRENT NETWORK TOPOLOGY
820
GENERATE BLOCK TREE (BT) BASED ON CURRENT NETWORK TOPOLOGY
830
SELECT BLOCK WITH MAXIMUM NUMBER OF NODES AS ROOT BLOCK
840
IDENTIFY OTHER BLOCKS AS LEAF BLOCKS
850
MOVE LEAF BLOCKS TO MAKE NETWORK BICONNECTED
860
END

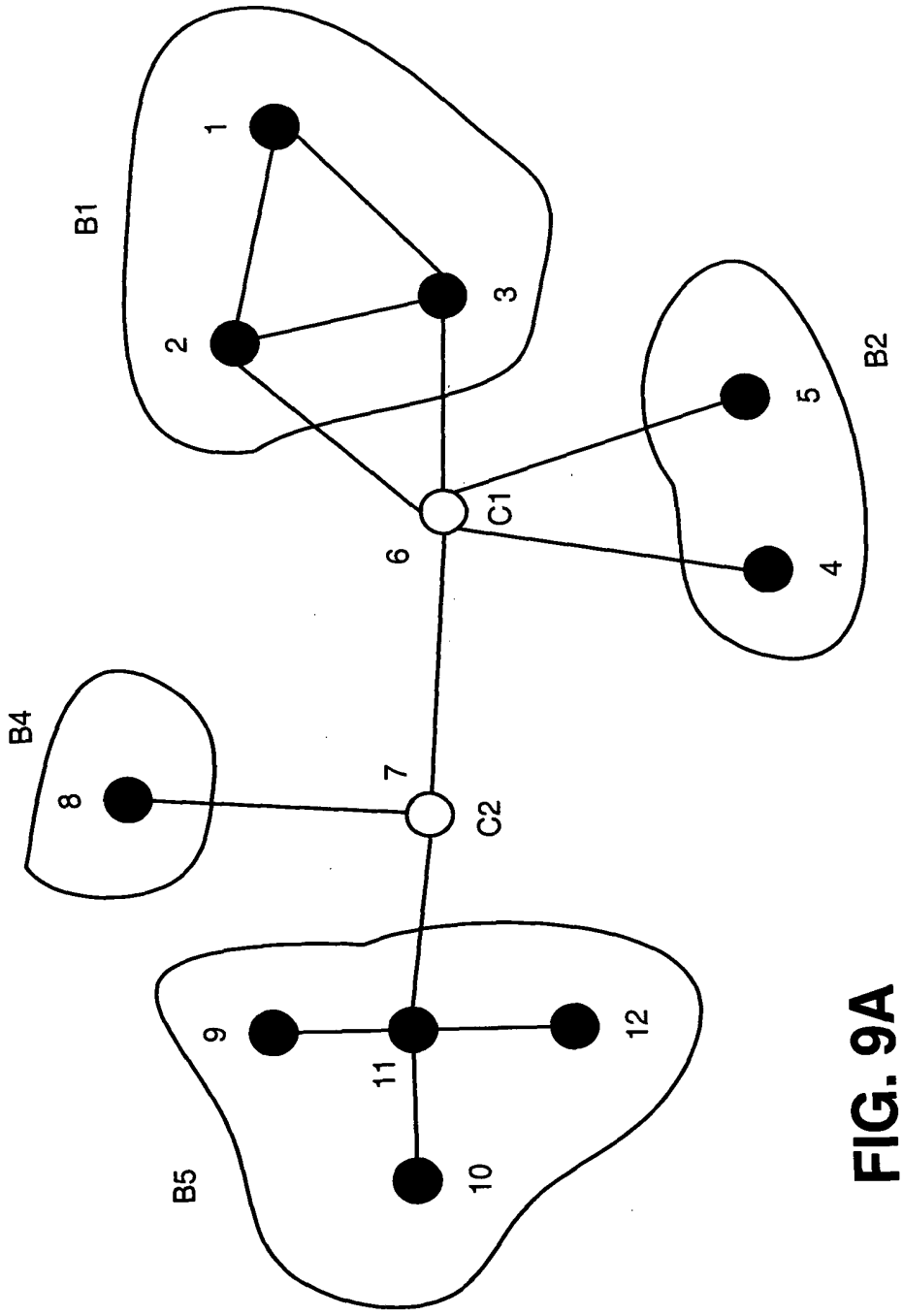


FIG. 9A

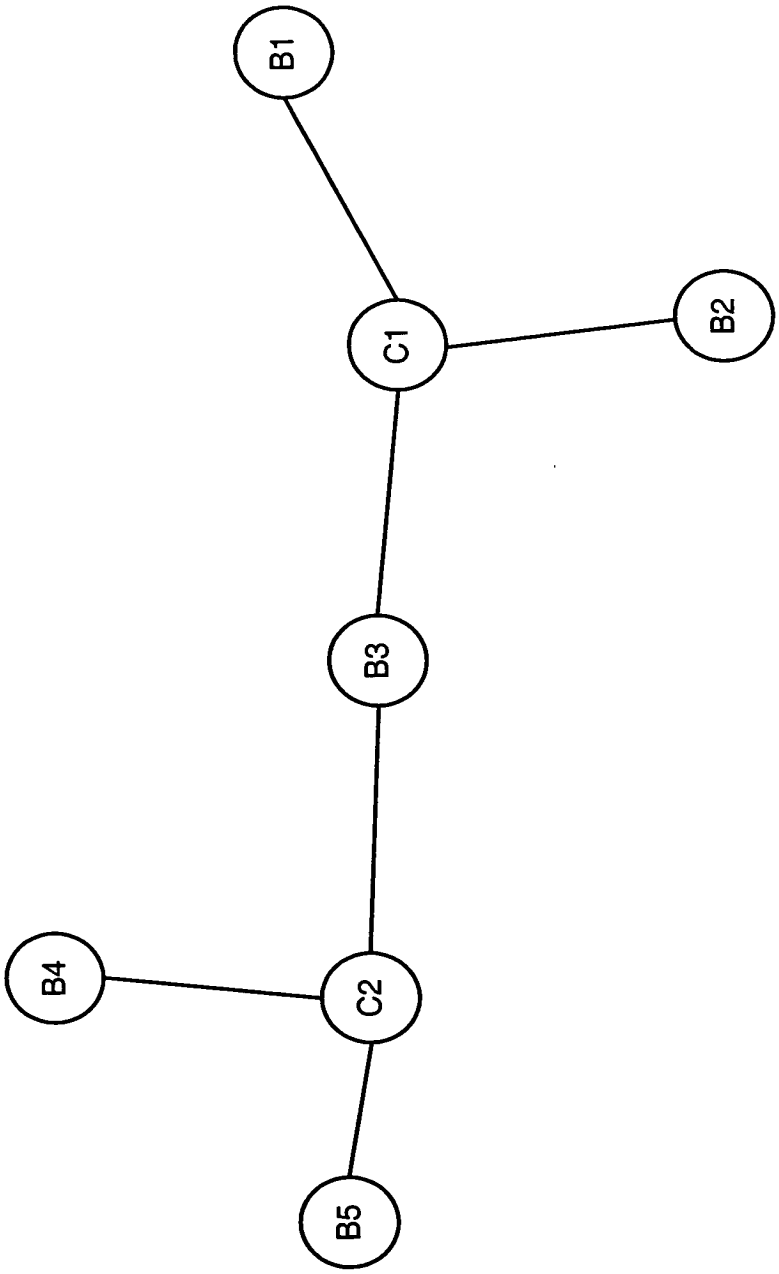


FIG. 9B

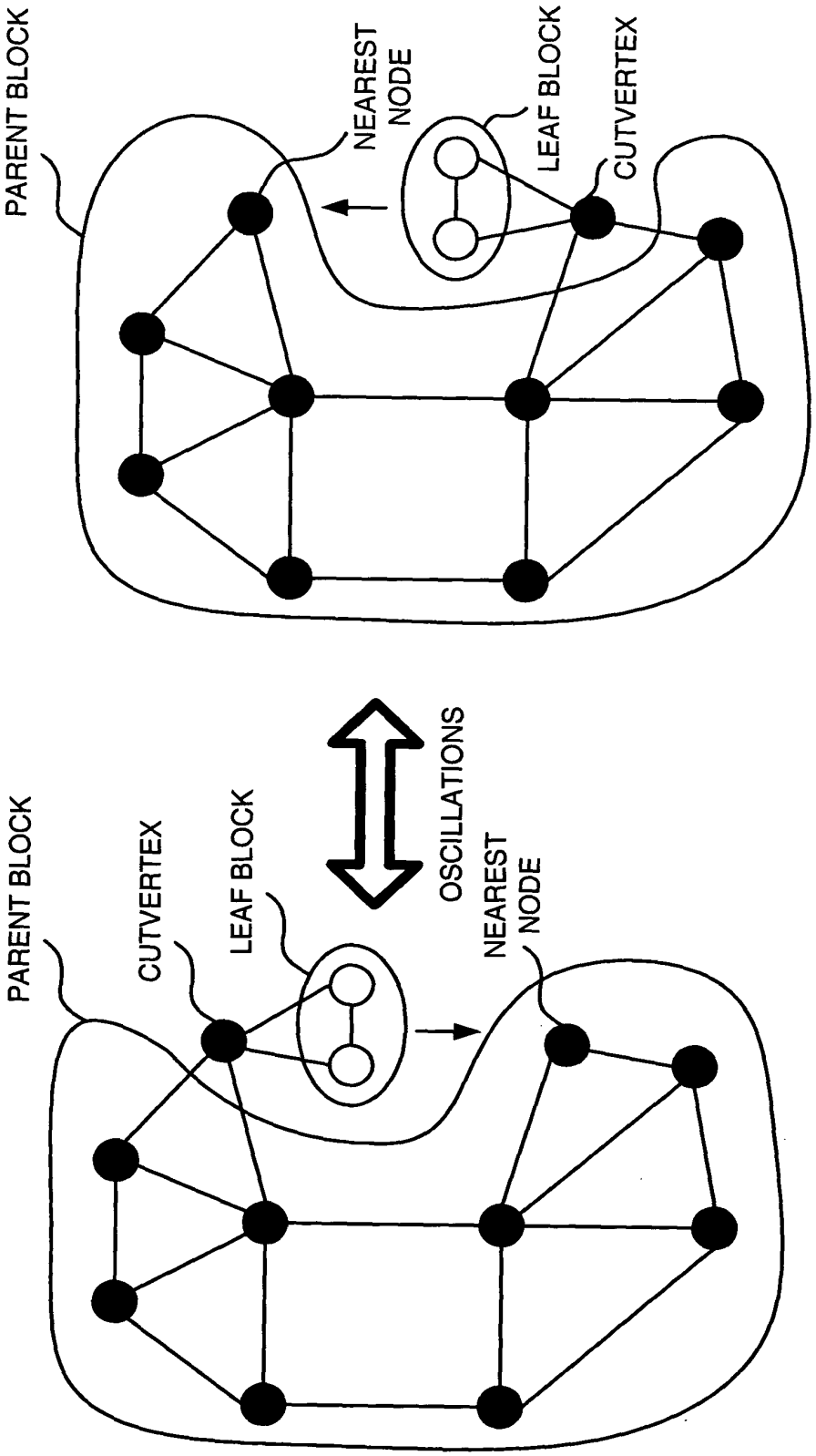

PARENT BLOCK
NEAREST NODE
LEAF BLOCK
CUTVERTEX
OSCILLATIONS
PARENT BLOCK
CUTVERTEX
LEAF BLOCK
NEAREST NODE

FIG. 10

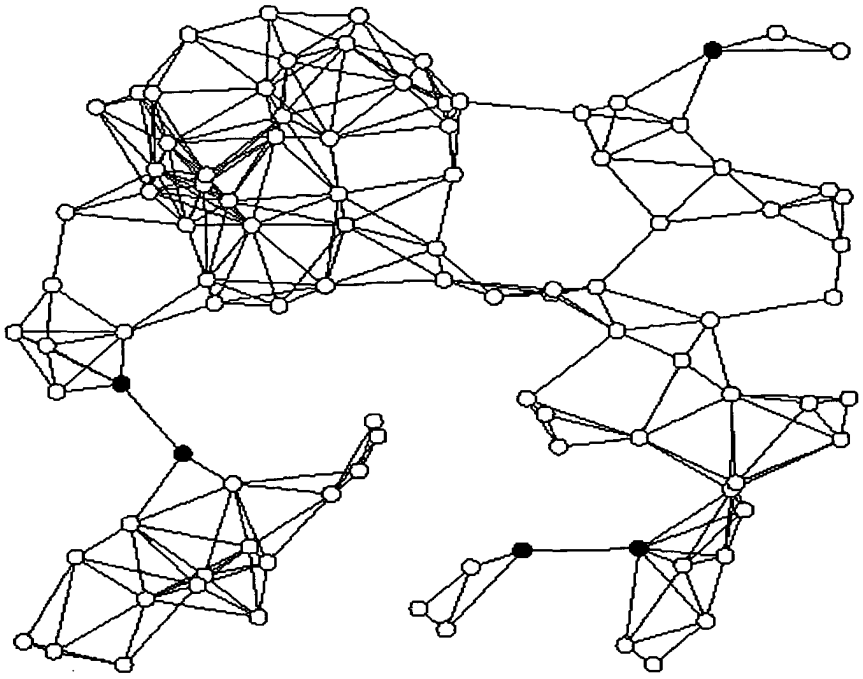


FIG. 11B

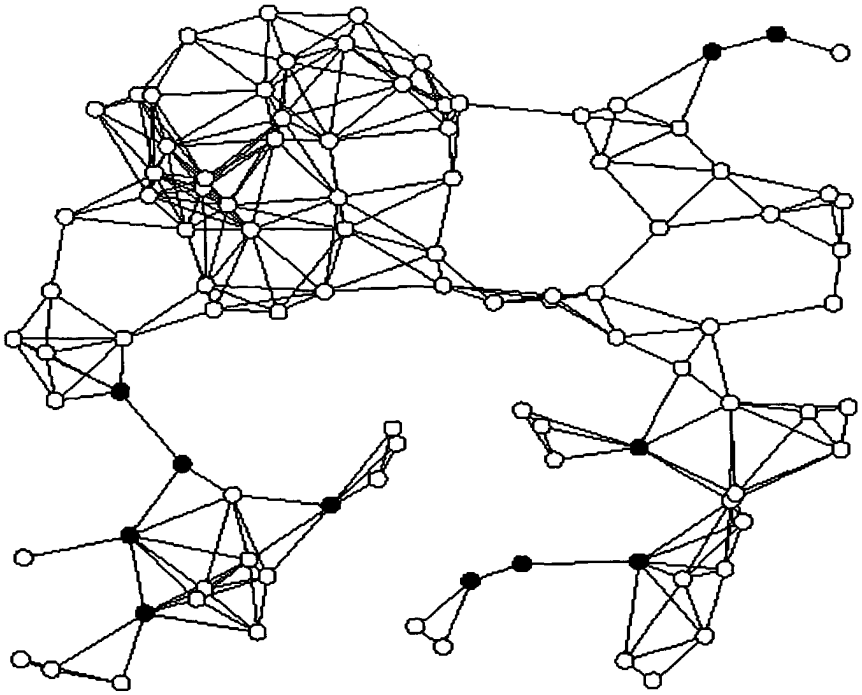


FIG. 11A

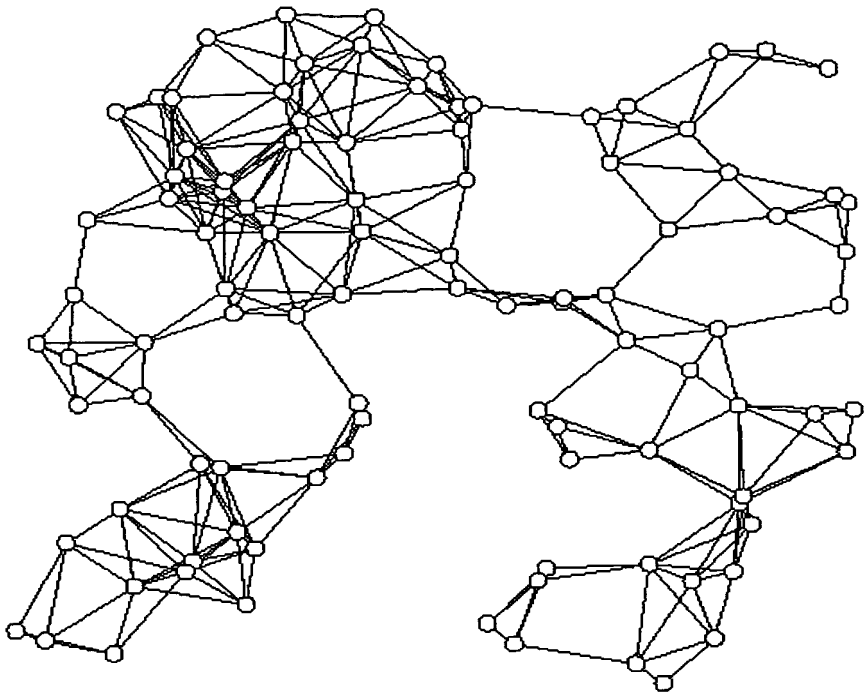


FIG. 11D

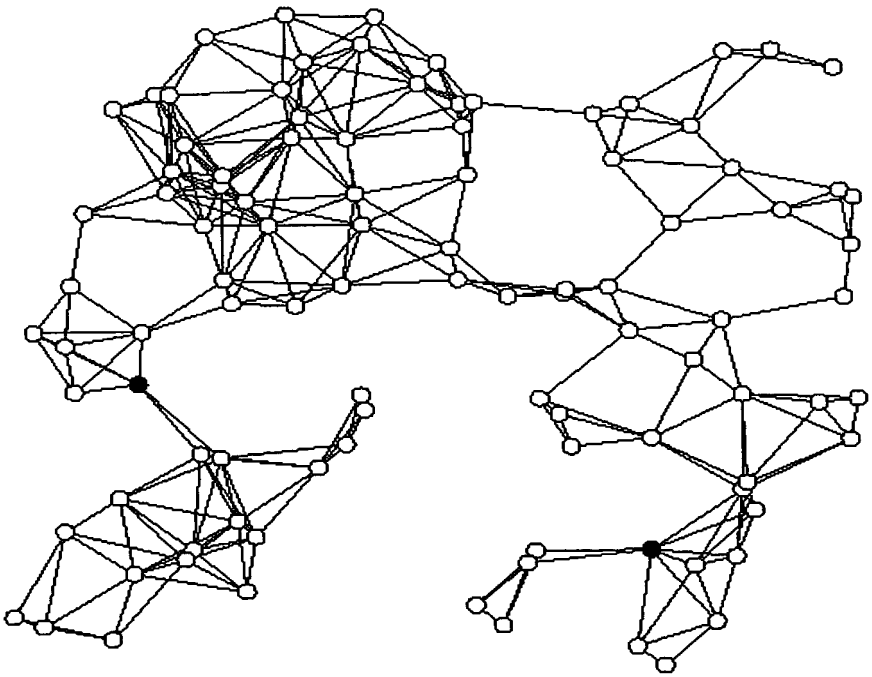


FIG. 11C

FIG. 12A

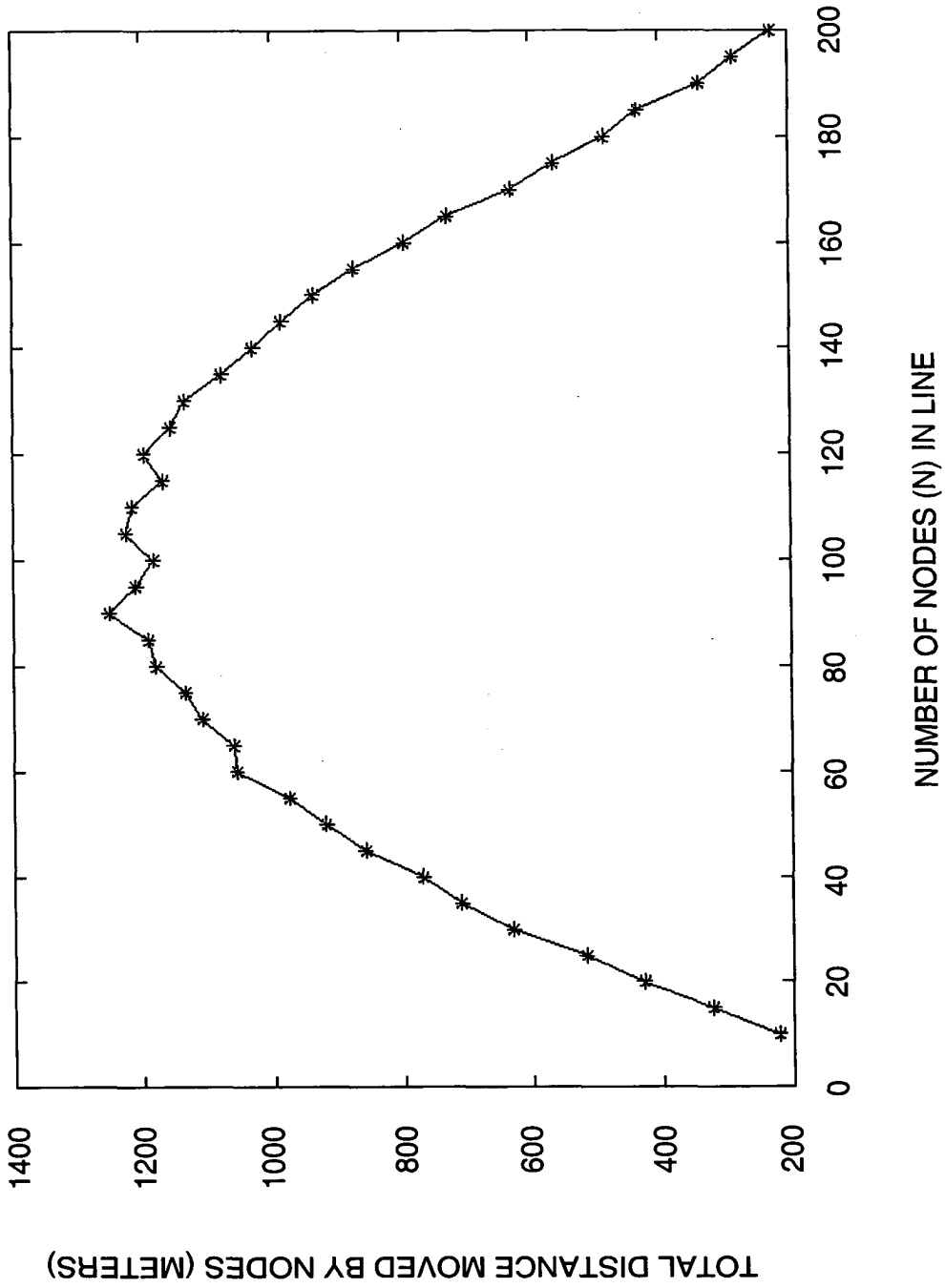

TOTAL DISTANCE MOVED BY NODES (METERS)
1400
1200
1000
800
600
400
200
0
20
40
60
80
100
120
140
160
180
200
NUMBER OF NODES (N) IN LINE

FIG. 12B

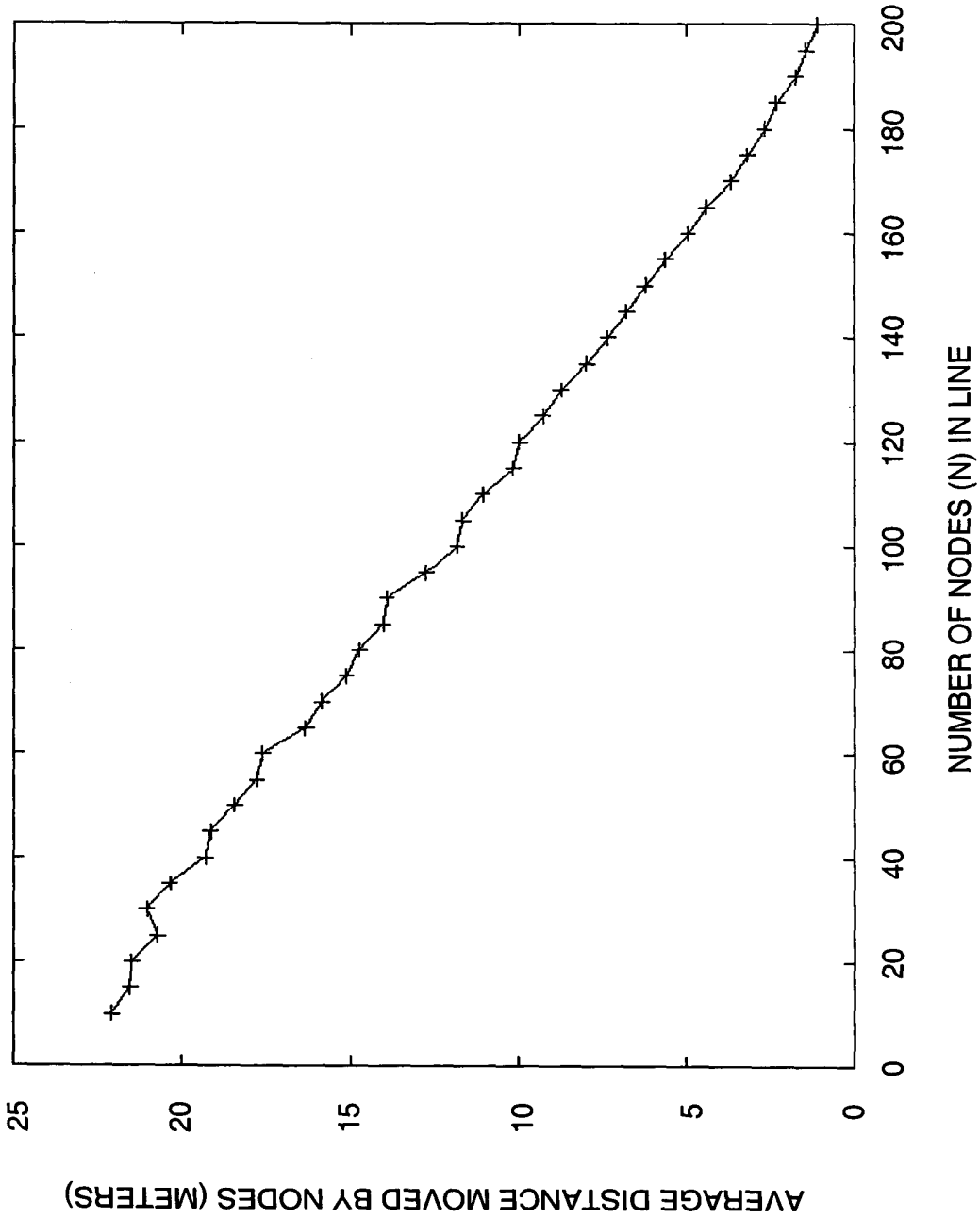

AVERAGE DISTANCE MOVED BY NODES (METERS)
0
5
10
15
20
25
NUMBER OF NODES (N) IN LINE
0
20
40
60
80
100
120
140
160
180
200

FIG. 13A

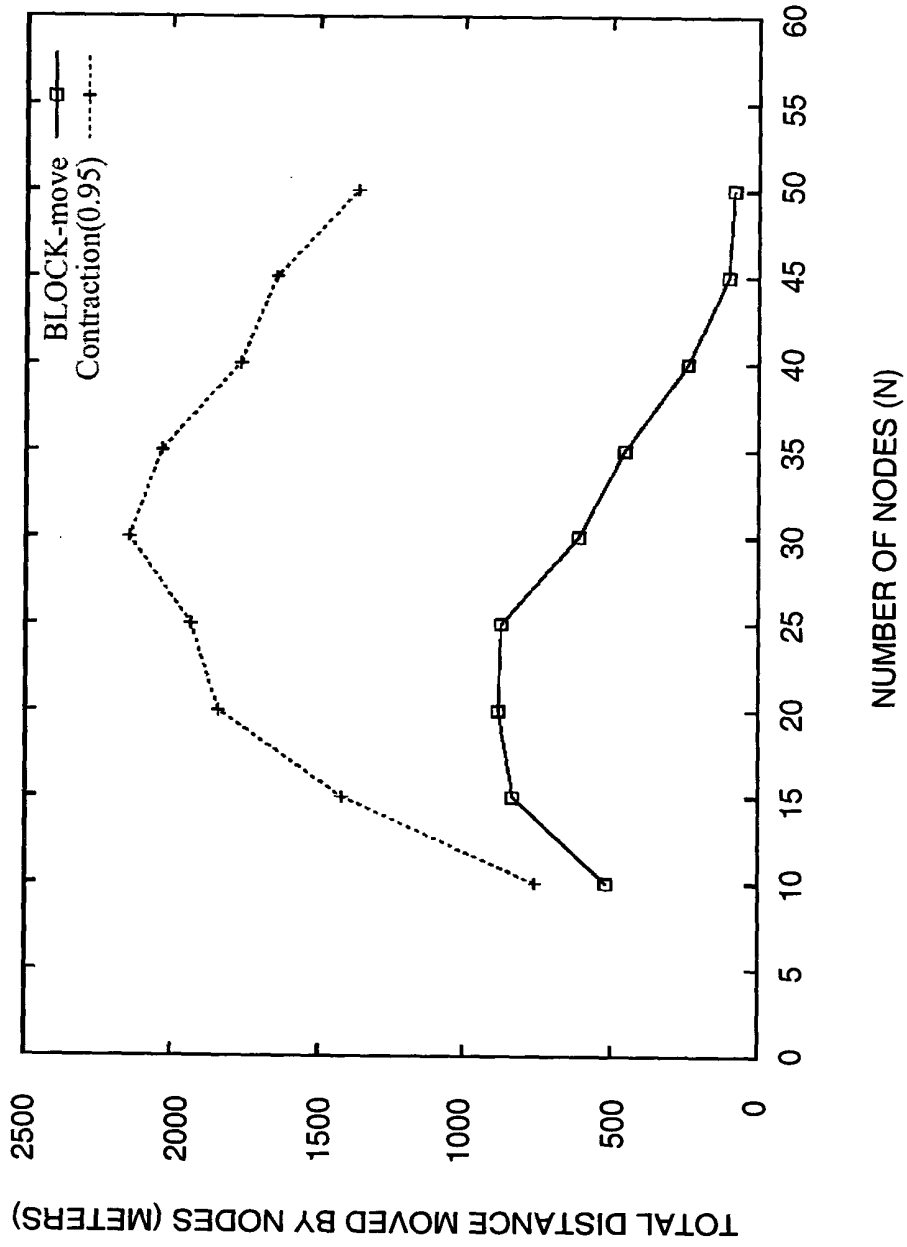

BLOCK-move
Contraction(0.95)
TOTAL DISTANCE MOVED BY NODES (METERS)
NUMBER OF NODES (N)
0
500
1000
1500
2000
2500
0
5
10
15
20
25
30
35
40
45
50
55
60

FIG. 13B

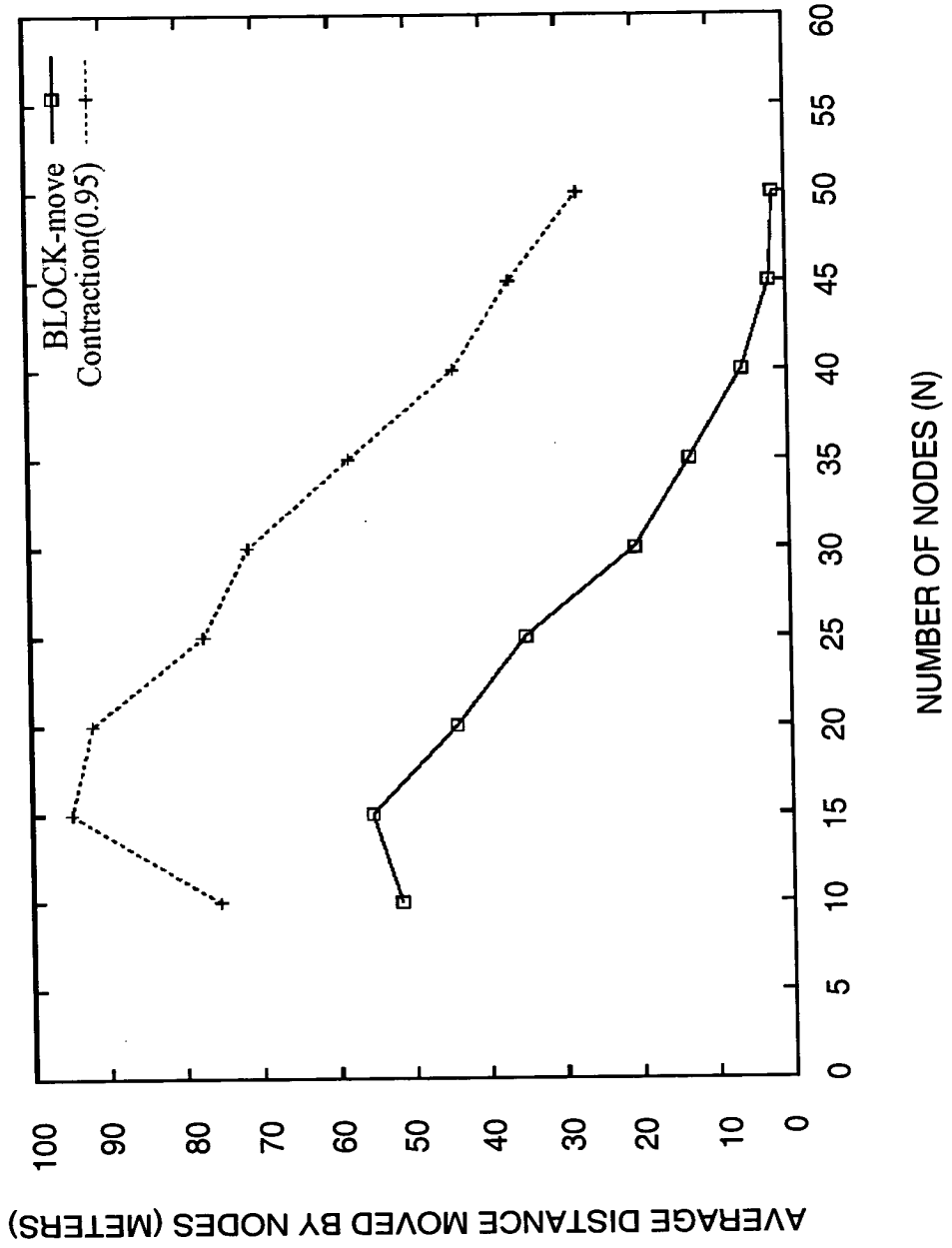

BLOCK-move
Contraction(0.95)
AVERAGE DISTANCE MOVED BY NODES (METERS)
NUMBER OF NODES (N)
0
10
20
30
40
50
60
70
80
90
100
0
5
10
15
20
25
30
35
40
45
50
55
60

FIG. 14

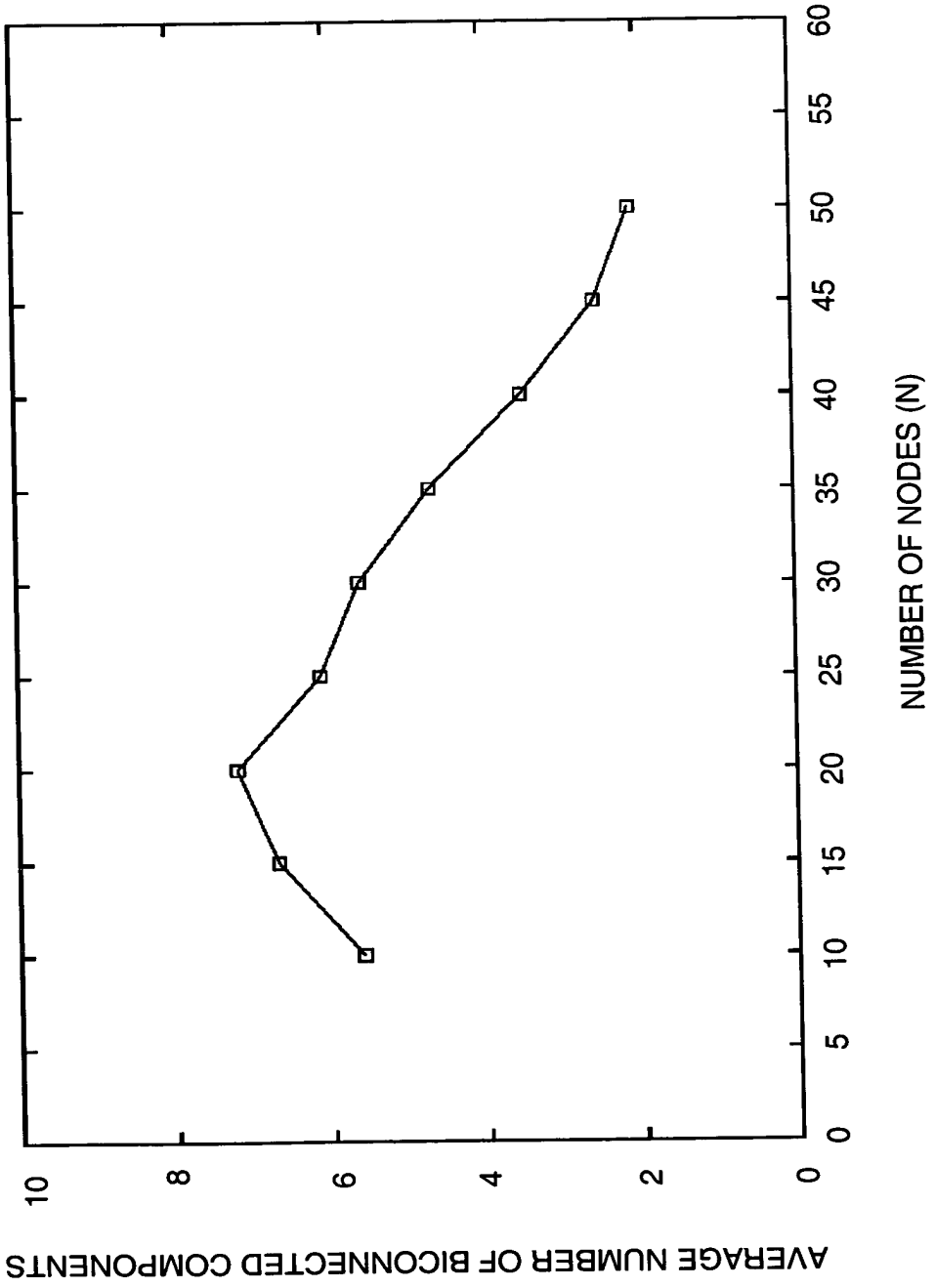

AVERAGE NUMBER OF BICONNECTED COMPONENTS
0
2
4
6
8
10
NUMBER OF NODES (N)
0
5
10
15
20
25
30
35
40
45
50
55
60

FIG. 15

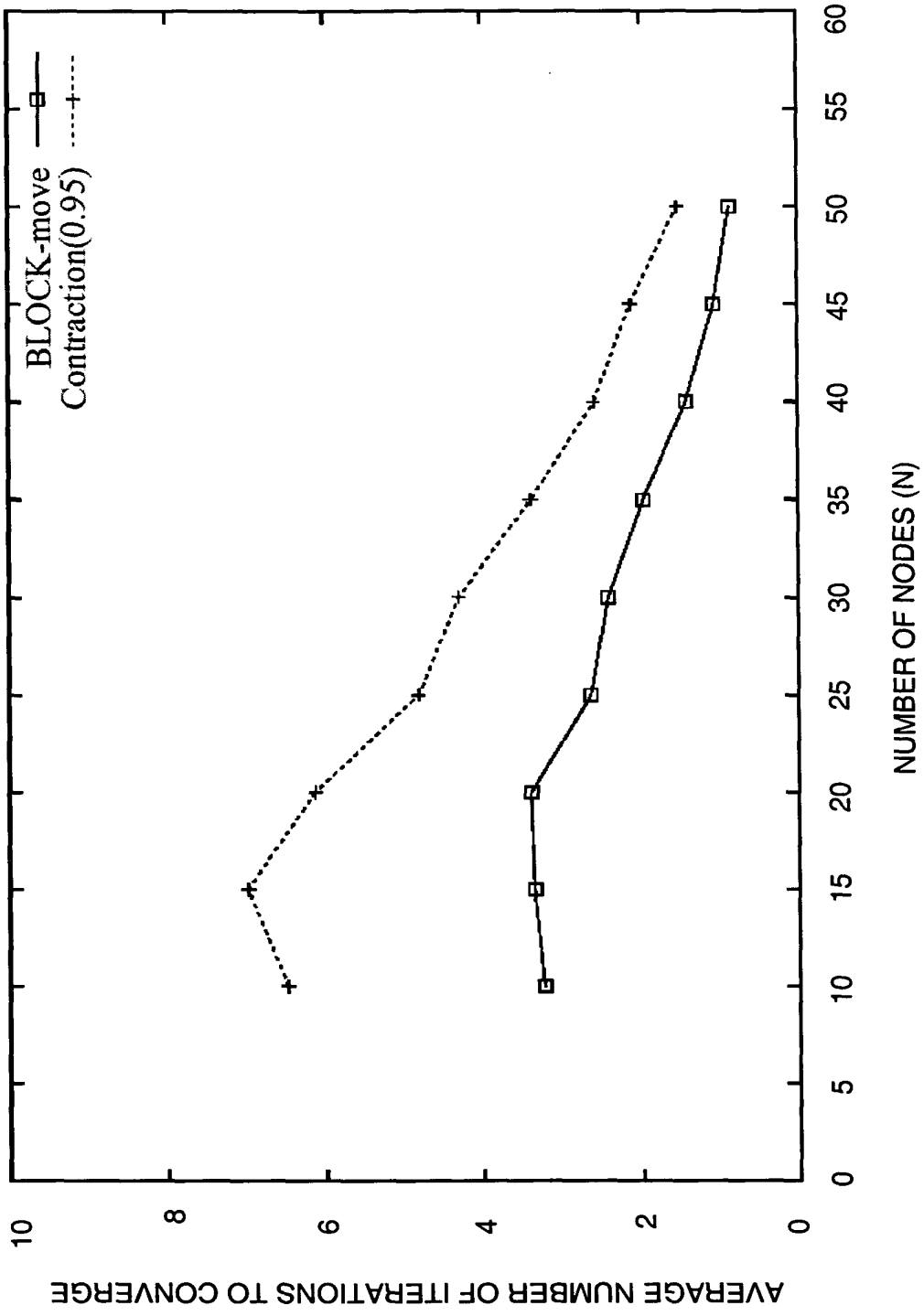
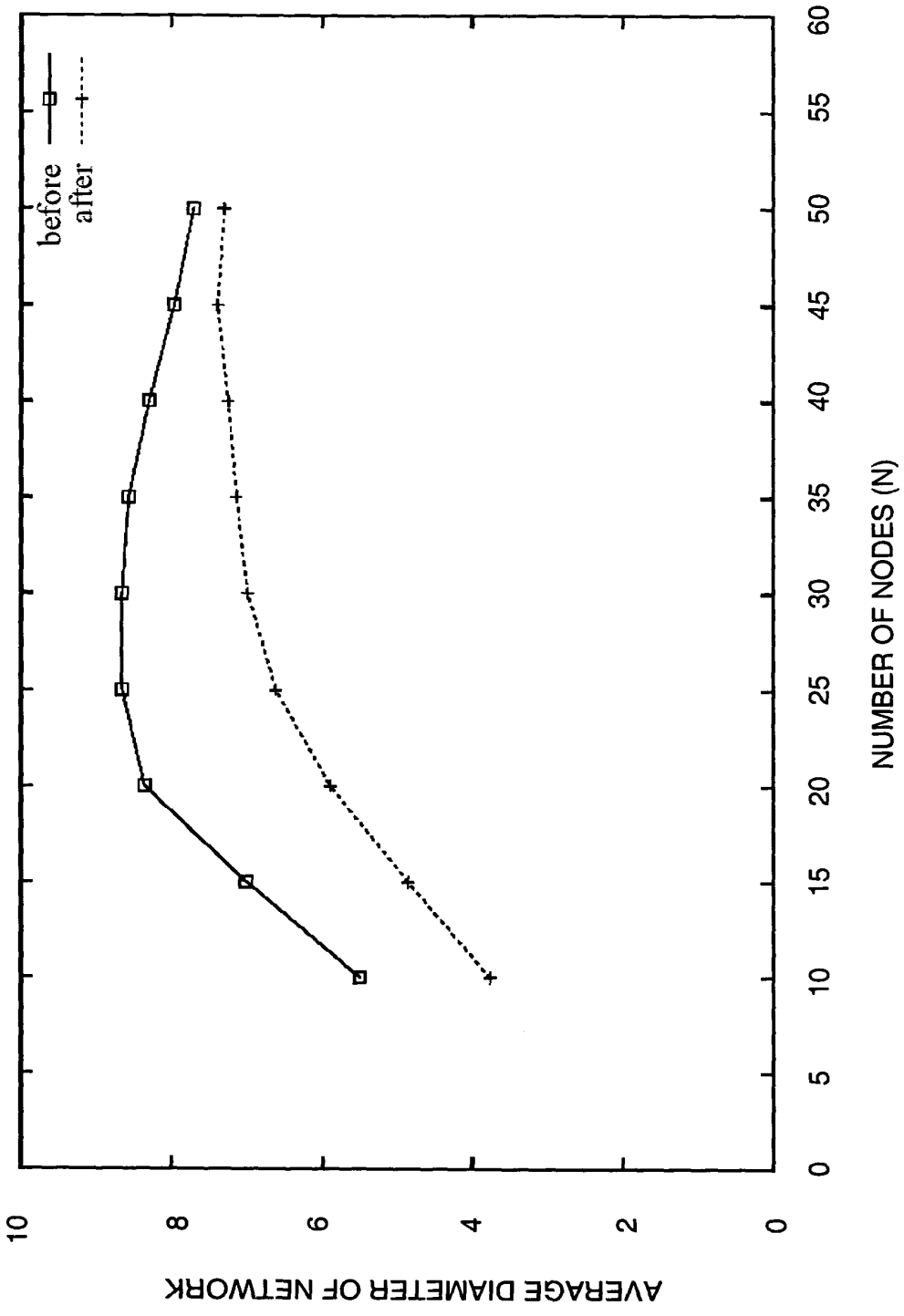

BLOCK-move
Contraction(0.95)
AVERAGE NUMBER OF ITERATIONS TO CONVERGE
NUMBER OF NODES (N)
0
2
4
6
8
10
0
5
10
15
20
25
30
35
40
45
50
55
60

FIG. 16


before
after
AVERAGE DIAMETER OF NETWORK
NUMBER OF NODES (N)
0
2
4
6
8
10
0
5
10
15
20
25
30
35
40
45
50
55
60